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ABSTRACT

This report sets out to describe the emergence of new school design concepts during 1968-1975 in Australia. The report draws heavily on Western Australian sources particularly in the historical perspective prior to the 1960s. However, where possible developments are covered in all states and the two territories. An attempt is made to describe what is meant by "open plan" and to identify the antecedents of change in earlier decades that culminated in the new schools. This is followed by a brief account of the evolution of educational architecture since the advent of compulsory education. A subsequent section that describes the major developments in the school construction programs of each state and territory presents a short chronology of the building innovations in the 1960s and 1970s. The educational rationale of open plan schools is then discussed. The intention is to describe, where possible, the official view of the state departments with respect to the educational advantages and teaching techniques associated with the new architecture. The report is concluded by a short discussion of the impact of the new school designs. (Author/RLF)

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THE AUSTRALIAN OPEN AREA SCHOOLS PROJECT

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THE DEVELOPMENT OF OPEN PLAN PRIMARY SCHOOL BUILDING DESIGN IN AUSTRALIA

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Fitzpatrick, G.S. and Zani, T.L. *Australian Open Area Schools Project, Technical Report No. 2: Teachers' Comments on Open Area and Conventional School Design.* West Perth: Education Department of Western Australia, 1974.

Beck, Tinsley M. *Australian Open Area Schools Project, Technical Report No. 3: Openness as a Variable in Educational Research.* West Perth: Education Department of Western Australia, 1975.

Angus, M.J., Evans, K.W. and Parkin B. *Australian Open Area Schools Project, Technical Report No. 4: An observation Study of Selected Pupil and Teacher Behaviour in Open Plan and Conventional Design Classrooms.* West Perth: Education Department of Western Australia, 1975.

AUSTRALIAN OPEN AREA SCHOOLS PROJECT

Technical Report No. 5

THE DEVELOPMENT OF OPEN PLAN PRIMARY SCHOOL BUILDING DESIGN IN AUSTRALIA

B. Keating and T.L. Zani
Research Branch, Education Department
of Western Australia

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FOREWORD

From the monitorial schools of the 19th Century to the primary schools of the 1970's there has been a discernible evolution in school architecture. The changes in architecture have often been accompanied by changes in teaching practices though the relationships between these two phenomena are neither simple nor well documented. The Australian Open Area Schools Project is an attempt to evaluate contemporary school buildings with special reference to their effects on educational programmes.

The present report focuses on the historical development of open plan schools in Australia, documenting where possible some of the major events. This is expected to be the last in the series of Technical Reports and the Project will conclude with a major report on the study as a whole.

The authors, Mr Brian Keating and Mr Lester Zani, acknowledge the contributions of the Technical Representatives of the Project in the States and Territories who have assisted by commenting on sections relating to their school systems. They also express appreciation to Mr Max Angus, Superintendent of Research, for his overall guidance in the organisation and presentation of this document; to Dr Jane Figgis whose initial research in this area provided a distinctive starting point; and to the Public Works Departments and Education Department Buildings Branches whose reports and plans have formed a most valuable primary source for the Report. Finally, thanks are extended to Mrs Margaret Hollier for her typing and to those who in other ways assisted in the production of the Report.

DR A.N. STEWART
PROJECT DIRECTOR

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GLOSSARY

Bristol Classroom:

An aluminium prefabricated unit originally developed in the United Kingdom and used widely in Australia after World War II to meet the demand for emergency accommodation.

Cluster:

A term used in Western Australia to describe a group of classrooms organised around a common courtyard. The term has also been used to identify a similar design in New South Wales.

Committed Space/Specialised Learning Area:

An area, such as a practical, quiet, withdrawal or resource area, which has been designed for a particular activity as distinct from general teaching.

Educational Facilities Laboratories (E.F.L.):

A non-profit organisation established in New York City by the Ford Foundation to help schools with their physical problems by encouraging research and dissemination of knowledge regarding educational facilities.

Educational Facilities Research Laboratory (E.F.R.L.):

A group within the Victorian Education Department engaged in research and evaluation of educational facilities.

Flexible Partition/Operable Wall:

A sliding, folding or concertina partition which can be manoeuvred to define and divide learning areas.

Flexible Plan School:

A South Australian model that has built-in sliding or folding partitions or walls to allow the total area to be arranged into a variety of areas.

Flexipod School:

An open plan design developed for primary schools in Victoria.

x

General Learning Area/Uncommitted Area:

A space that parallels the area occupied by desks in conventionally arranged classrooms, which is uncommitted to specialised activities.

Monitorial School:

A large open space school supervised by a master teacher and assisted by monitors, functioning in England in the early decades of the 19th Century.

Multiple-Area:

A term describing a Queensland school built on open plan lines and emphasising the concept of multi-purpose space.

Linear School:

A school consisting of a line of self-contained classrooms sharing a common corridor or verandah. Classrooms may be arranged in single row, quadrangle, or finger plan design.

Open Area/Open Plan/Open Space:

In general these are synonymous terms used in their respective countries of origin. Occasionally they refer to discrete areas and at other times they are used as descriptors for total schools.

Practical Area/Wet Area:

An area distinct from the general learning area having facilities and surfaces for activities of a practical nature such as craft, art, and science.

Quiet Area:

A recess or small room open to and partly visible from the general learning area.

SAMCON (South Australian Modular Construction):

A system employing modular construction of classrooms, developed in South Australia in the early 1960's.

Self-Contained Classroom:

A room that is fully enclosed and accommodating approximately 30-40 pupils under the direct supervision of one teacher.

Studies in Educational Facilities (S.E.F.):

A project set up by the Metropolitan Toronto School Board to provide recommendations on educational specifications and user requirements.

Withdrawal Area:

A visually and acoustically separate room to which groups can withdraw for special activities, such as drama and films.

INTRODUCTION: PERSPECTIVE OF THIS REPORT

There are many educationists who assert that school architecture can be a pivotal factor in the total learning environment for teacher, pupil and administrator. In an historical study of English education from 1870-1970, Dent (1970) emphasised the significance of architecture for productive learning in the following terms:

> First, foremost and all the time, in any education system, it is the teachers who matter most. But it is the gravest error to say (as is often said): 'Teachers matter, but not the buildings'. In fact, the buildings matter a very great deal. Good buildings, well equipped, make both teachers' and pupils' work easier as well as more agreeable (p.139).

This report sets out to describe the emergence of new school design concepts during 1968-1975 in Australia. One of the real problems encountered in the collection of information about a national phenomenon is the unavoidable difference in the quantity of data available for examination from different States. The report draws heavily on Western Australian sources particularly in the historical perspective prior to the 1960's. However, where possible an attempt has been made to cover developments in all States and the two Territories.

An attempt is made to describe what is meant by 'open plan' and to identify the antecedents of change in earlier decades that culminated in the new schools. This is followed by a brief account of the evolution of educational architecture since the advent of compulsory education. A subsequent section which describes the major developments in the school construction programmes of each State and Territory presents a short chronology of the building innovations in the 1960's and 1970's. The educational rationale of open plan schools is then discussed. The intention here is to describe, where possible, the official view of the State Departments with respect to the educational advantages and teaching techniques associated with the new architecture. The report is concluded by a short discussion of the impact of the new school designs.

It has not been possible to identify the exact source of many of the ideas incorporated in these new schools. Often the designs were probably the inspiration of a single architect or the consensus view of a team established in the various States. However, designs usually evolved at the committee interface between educator and architect. In Western Australia for instance, the Primary School Design Committee has been the arena in which innovations have been developed and clarified. It is important to note that designs produced by these groups reflected not only an architectural viewpoint but also an educational philosophy.

Ackerman (1969) as Professor of Fine Arts, Harvard University, asserted that:

> In building...it is hard to give form to any content without expressing a point of view; buildings almost always say something about the people who make them...(p.4).

If Ackerman is correct then the variety of structures in the open plan schools reflects not only the architectural objectives of design, but also the educational rationale of school systems. What do Australian open plan buildings tell us about the various State school systems? Answering this question forms much of the substance of this report.

Although this report confines itself to an examination of open plan architecture in Government primary schools, it is necessary to acknowledge the construction of numbers of innovative designs in the private school system. These particular school designs were usually planned by private architects, and were therefore not under the direct supervision of Public Works Departments or Buildings Branches of Education Departments.

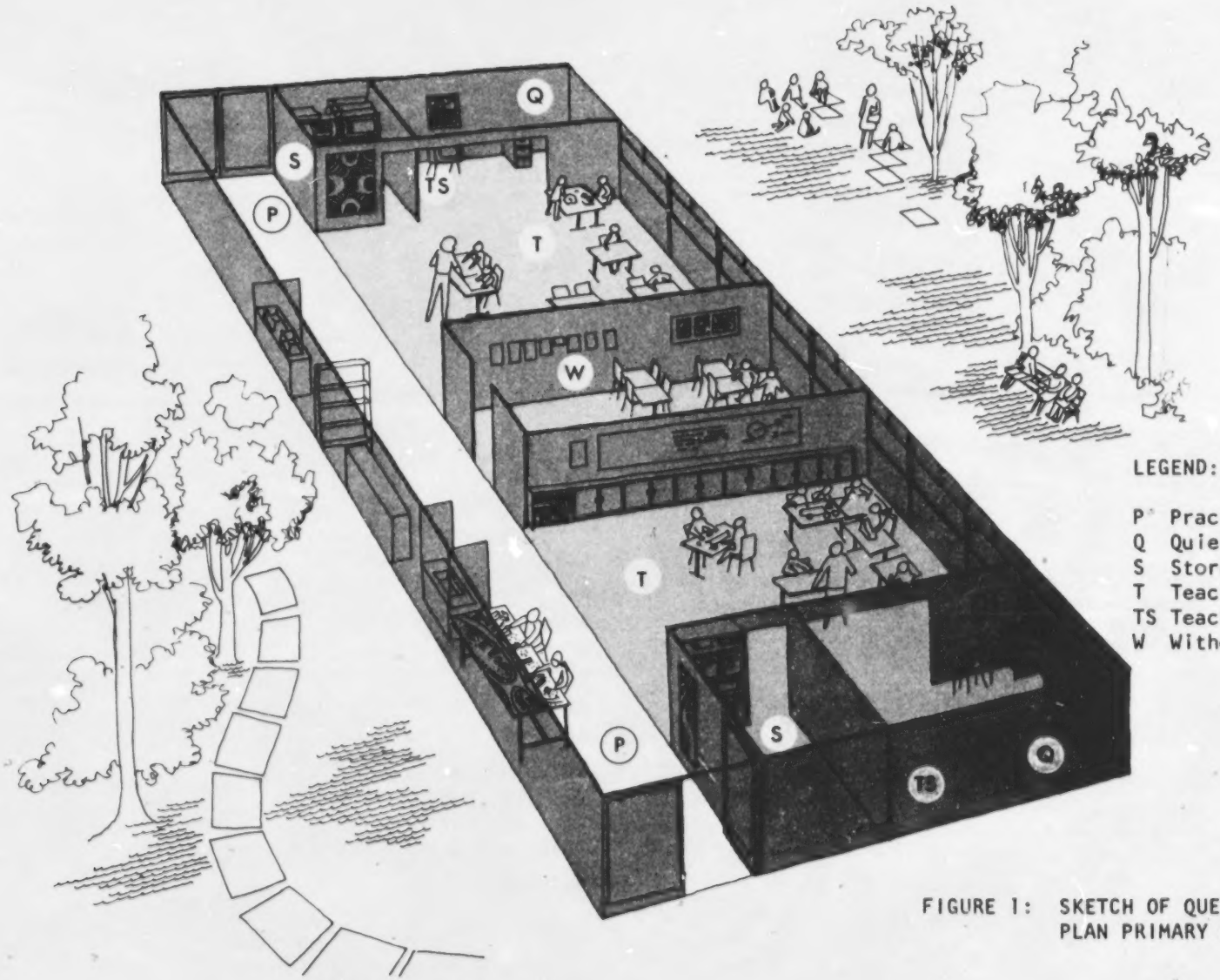
WHAT IS AN OPEN PLAN SCHOOL?

The new primary school designs of the late 1960's and the early 70's that are the focus of this report have been described by many terms such as cluster, open plan, open area, open space, flexible plan and multiple area. South Australian educators have described their new schools as open space or flexible plan while Queenslanders referred to their new designs as multiple area schools. In the early developments in Western Australia the term cluster was employed while later designs were referred to as open area schools. The nomenclature indicates the varying orientations of the States and the two Territories to school architecture; there was never a national set of guidelines or a concerted attempt to standardise nomenclature let alone architectural briefs. The general term 'open plan' has been adopted for the purpose of this report to refer to all types of school buildings which have departed from the traditional self-contained classroom design.

The construction of open plan schools during the late 1960's represented a significant departure from traditional primary school architecture. Replacing the familiar rows of standard classrooms were buildings often without interior walls and ranging in overall size from the equivalent of two to eight self-contained classrooms. As well as providing physically more open buildings, architects attempted to provide a variety of enclosed or semi-enclosed spaces (see Figures 1 and 2).

A conventionally designed school was largely an aggregation of rectangular self-contained classrooms plus a few limited specialist facilities such as an administration block and storerooms, and a hall if the school was fortunate. Open plan design rejected the concept of an all-purpose classroom space to suit all teachers, children and activities, and opted for larger general learning areas plus a variety of special purpose areas. The new schools often included an array of facilities ranging from specialised and practical areas to carpets and acoustic treatments. The physical appearance of the school was changed dramatically with the upgrading of internal facilities.

Probably the most striking feature of the open plan design was the size and shape of the general learning areas (see Figure 3) which have



LEGEND:

P Practical Area
Q Quiet Area
S Store
T Teaching Area
TS Teachers' Space
W Withdrawal Area

FIGURE 1: SKETCH OF QUEENSLAND OPEN PLAN PRIMARY SCHOOL (1971)

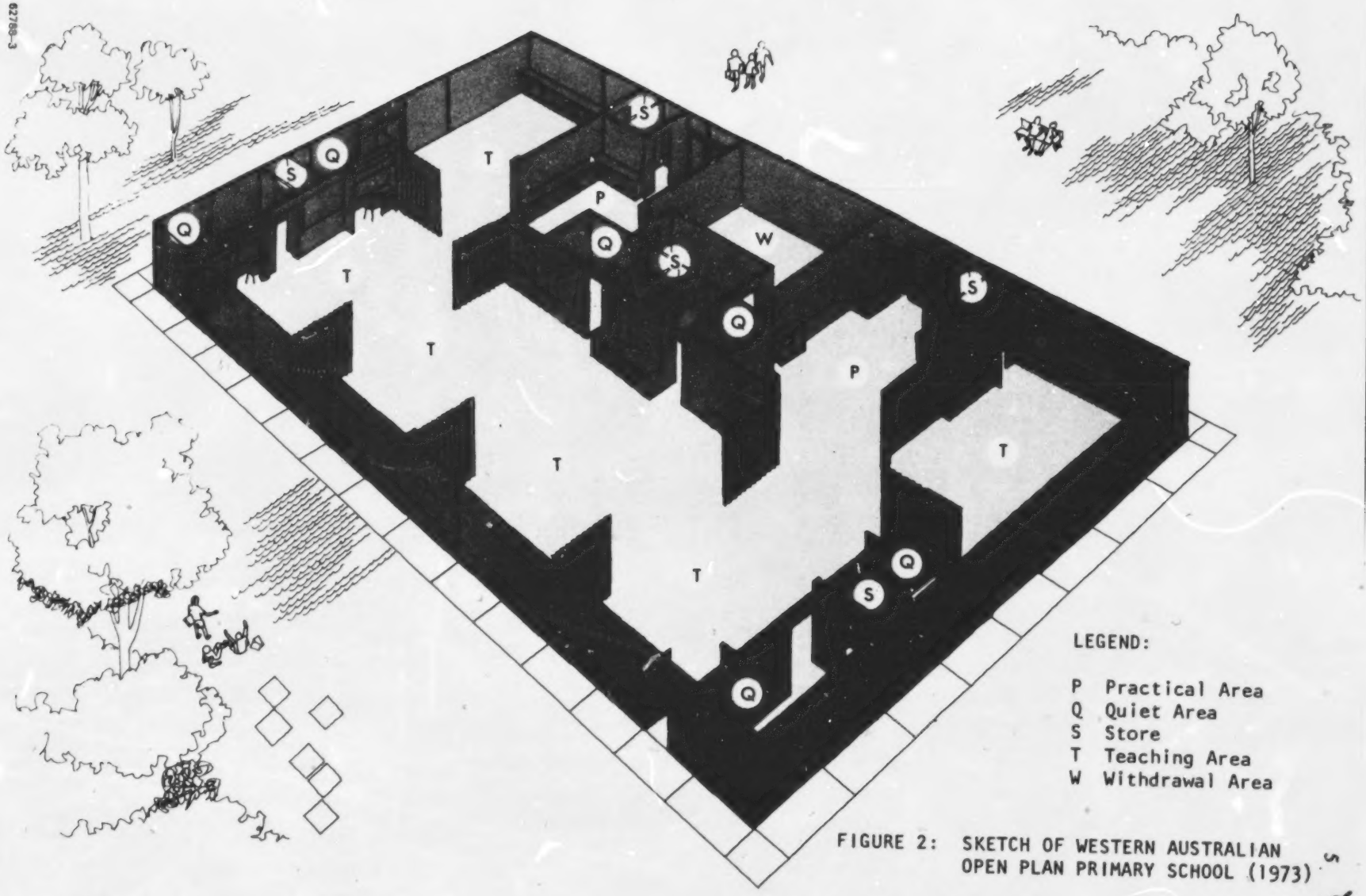
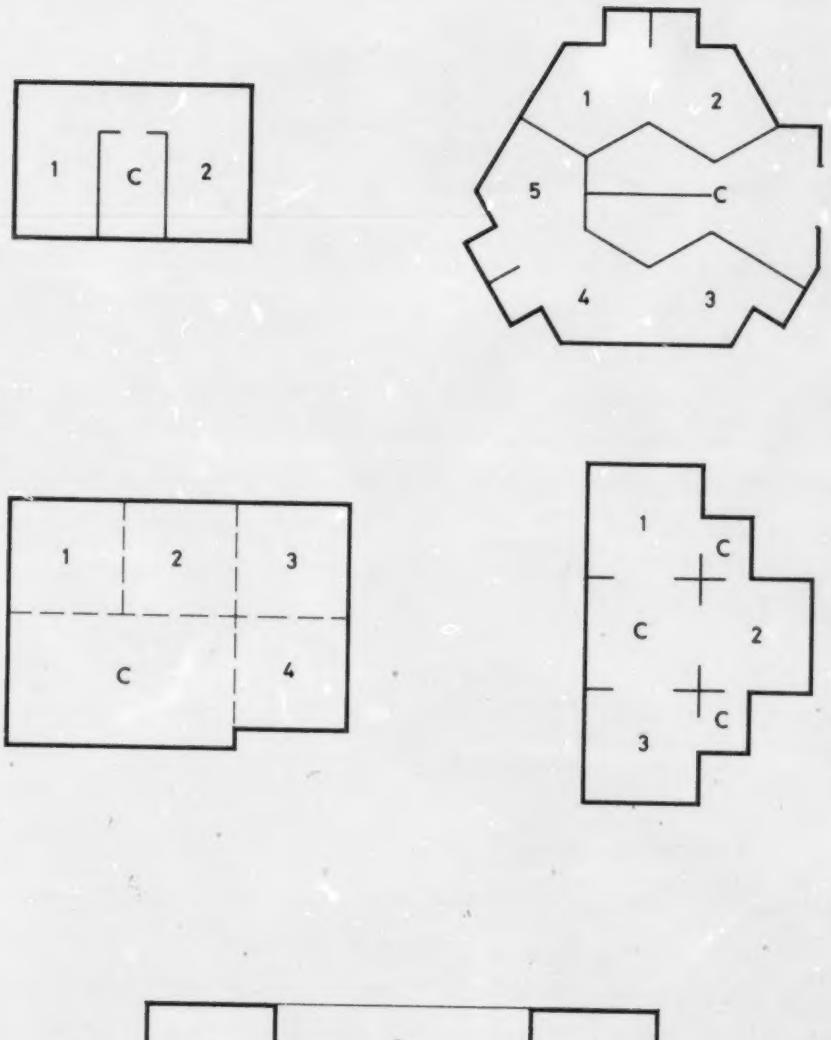


FIGURE 2: SKETCH OF WESTERN AUSTRALIAN OPEN PLAN PRIMARY SCHOOL (1973)

been variously described as open learning, open teaching, general activity and uncommitted areas. The proposed function of a general learning area was presumably to encourage flexibility in the organisation of learning experiences. To enhance the degree of flexibility of the areas they were typically fitted with movable partitions. For large group activities teachers could elect to team together. At other times children could work in small groups arranged informally throughout the area, or teachers could choose to adopt the grouping of the traditional class arrangement.

The provision of spaces for particular kinds of work was one of the distinctive innovations associated with open plan design. These special committed areas were given descriptive names such as practical areas, withdrawal areas, quiet areas and resource areas. Practical areas nearly always accommodated a sink with water supply, bench tops and cupboards, together with a variety of equipment and materials for use in drawing, painting, clay modelling, cooking and in simple scientific experiments. Withdrawal areas were planned for group activities likely to create a general disturbance if held elsewhere within the building while quiet areas were spaces where children could retire to read or study individually. In some schools, resource areas were incorporated into the building to accommodate library and teaching aids.

Consequently it is possible to analyse open plan designs in terms of the spatial arrangement of general and specialised learning areas. Different combinations of general and specialised learning areas in the total design have produced a variety of spatial layouts. Models of various spatial relationships have been indicated in Figure 4. These models show how ancillary facilities can be related to the general learning areas and how extensions can be made to an existing school structure. In Australia, the committed spaces have usually been positioned on the perimeter of the building. However, in some experimental designs the committed area has been located in the core of the building. The fragmented plan, with the committed and uncommitted areas housed in separate units, has generally not been adopted in Australian primary schools. Preference has been to locate most specialised areas in the same building with the general learning areas, though resource centres have often been constructed as separate buildings.



LEGEND

C	Committed Space
1,2,3,...	General Learning Areas
———	Fixed Walls
-----	Operable Walls

FIGURE 3: FLOOR PLANS OF GENERAL LEARNING AREAS IN OPEN PLAN SCHOOLS

Another innovation within the new schools was the provision of more appropriate and comfortable furniture. The educational programme envisaged by administrators resulted in the adoption of new furniture of flexible shape which was intended to facilitate a wide range of activities. Light weight units of furniture such as trapezoidal tables could be easily and quietly moved on carpeted floors to serve the needs of different sized groups. Some items of furniture in the open plan schools could serve dual functions; for example, cupboards, trolleys and blackboards could also be used to define and divide spaces within the learning area and be easily rearranged to suit the changing needs of the class. However, this type of furniture is not unique to open plan schools, for it can now be found also in numbers of schools of conventional design.

Colour schemes have often been employed in open plan schools to create a bright and pleasant atmosphere. In many schools attention has been given to linking colour schemes of different areas with the accompanying fabrics for curtaining and carpeting. In some schools variations in colour and texture have been used to define areas, which gives them a special character.

New means of storage have been devised in these schools which provide personal storage of equipment and resource materials for each child, teacher and aide. Within many open plan schools teachers have also been provided with preparation rooms. One particular open plan unit built in South Australia has incorporated a staff room to serve the needs of a group of teachers and aides supervising approximately 140 children. In this design the teacher's preparation room has been located in convenient proximity to learning areas and it can facilitate co-operative planning among teachers.

Many designs have included a paved courtyard adjacent to the general learning area where children can conveniently engage in informal activities out of doors. Often such spaces have been landscaped with ornamental trees and shrubs to further create a pleasant learning environment.

Interpretations of open planning have tended to differ in North

America and the United Kingdom. United States school designers more typically have opted for 'wider open' spaces undifferentiated by fixed walls or partitions. The thinking in this case was that fixed walls limit the building flexibility, the corollary being that where partitions are necessary, mobile dividers are much more likely to satisfy user requirements than a wall permanently fixed. Such physically open schools have become known as 'barn' type schools for obvious reasons.

Consistent with this description, an Educational Facilities Laboratories Report (1972) has given this definition of American open plan schools:

> Open plan schools are simply composed of broad expanses of enclosed space unbroken by walls. Their clear-span interiors, usually carpeted and air-conditioned, are subdivided into smaller, discrete areas by the use of movable panels and screens, plants, or rolling casework ...Open plan schools often appear in a variety of imaginative shapes that reflect the fluid activities and functions within them -- circles, hexagons, polyhedrons and spirals...The final use of the school depends on the furniture and equipment that goes into the space and how it is arranged and rearranged. (p.32)

British architects have moved along different lines. Their preference has been to meet the variety of user needs by providing a variety of fixed spaces. This style became popularly known as the 'nook and cranny' type. Its advocates argued that as well as retaining a high degree of flexibility it had a measure of homeliness that was sometimes missing from the North American 'barn'.

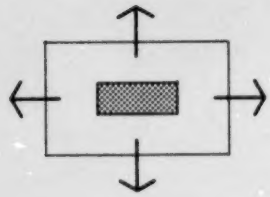
The basic ingredients of open plan schools in the United Kingdom were described by the Department of Education and Science (1972) as follows:

(a) a home base for a class group, where the children could relate to a specific teacher and place in the school;

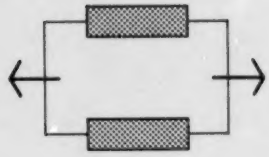
(b) an enclosed room for small groups where quiet or noisy activities could be conveniently carried on by children;

(c) a general work area, relatively uncommitted, in which furniture can be re-arranged in various ways for

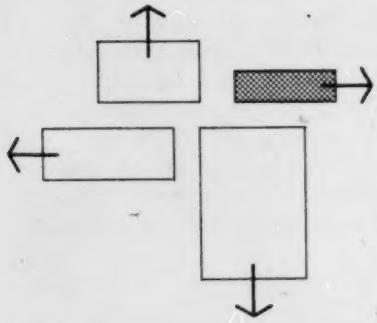
1
core plan
single building



2
perimeter plan
single building



3
fragmented plan
multiple building



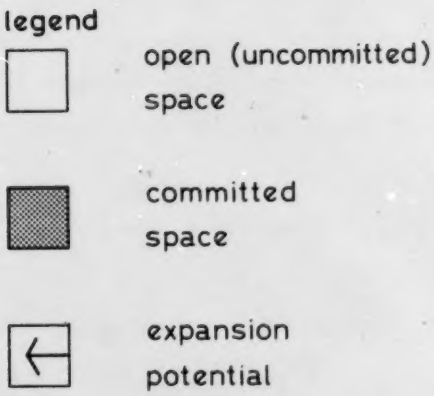


FIGURE 4: SPACE RELATIONSHIPS IN OPEN PLAN SCHOOLS
(Source: American Association of School Administrators, 1971, p.17)

spontaneous activities and groupings;

(d) a particular bay for kinds of work needing special equipment and services, such as cookery or scientific investigation, and

(e) an outdoor covered work area where the range of materials and activities can be greatly extended.

Synthesising the various international and national interpretations of open plan design, overall the lowest common denominator was the notion of differentiated instructional space. The design involved the elements of general space and specialised learning space, as well as improved facilities and furnishings. To paraphrase George (1976), no single term can accurately describe or delineate the considerable variety in the degree of openness, spatial arrangements and flexibility found in contemporary open plan school architecture.

ANTECEDENTS OF CHANGE

Evolution of School Architecture in Australia

In tracing the antecedents of change that led to open architecture in Australia it is clear there has been an evolution in school design particularly since the introduction of compulsory education in the 1870's. Although the conventional self-contained classroom design has predominated, there have been other designs in vogue at different times. In most cases these designs have been transplants of British school models.

The earliest schools in Australia were simple, rough buildings usually nothing more than one large room. These simple structures were the beginning of the one-teacher rural schools that so characterised the Australian school system in the early decades of this century. Interestingly, these one-teacher schools with the simple structure of one classroom, verandah and storeroom often operated on the lines of the open classroom of the 1970's. Frequently the one-teacher school was ungraded and pupils followed individualised programmes.

Whenever settlement seemed more permanent, larger schools often built in stone and brick replaced the first temporary structures. For example, in Western Australia, Perth Boys' School (1847) and Fremantle Boys' School (1854) emerged as handsome pieces of solid architecture constructed in the traditional ecclesiastical style. Although these schools looked most impressive from the outside with high windows and ornate brickwork, internally they were often ill-lit, poorly heated and overcrowded. The Educational Facilities Research Laboratory (1973, p.31) records that a School Inspector expressed admiration for the elegant brick buildings being erected in Victoria in 1871, but claimed that the architects neglected the internal requirements in their efforts for architectural display. A Tasmanian report of 1904 made similar criticisms (Austin and Selleck, 1975):

> The recently erected stone and wood buildings are needlessly expensive. In towers, cut stone, decorated window openings, open ceilings, gables etc., much money has been unwisely spent...The designs appear to have been drawn from the point of view of an architect rather than a teacher and often the ecclesiastical ideal is prominent. (p.255)

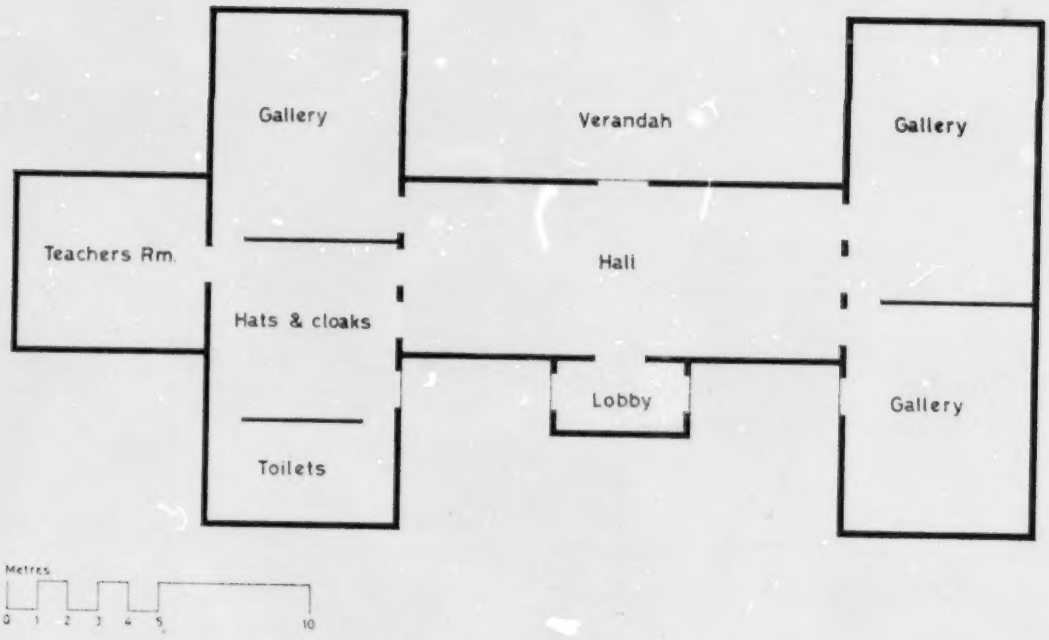


FIGURE 5: HALL-GALLERY DESIGN: PERTH CENTRAL INFANTS' SCHOOL, WESTERN AUSTRALIA (1897)

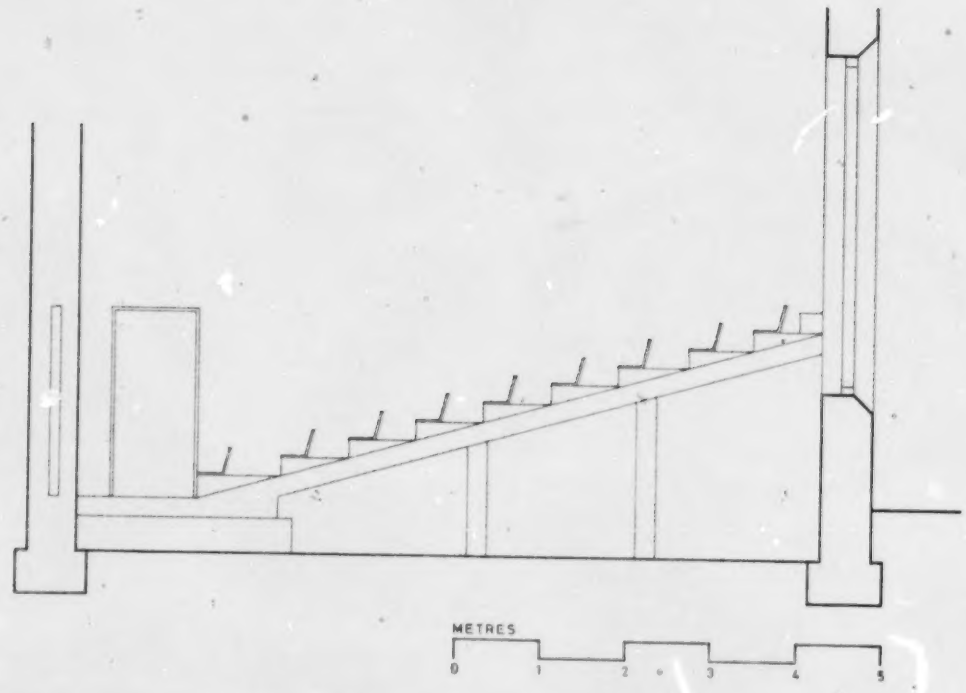


FIGURE 6: SECTION OF TEACHING GALLERY, FREMANTLE BOYS' SCHOOL, WESTERN AUSTRALIA (1870)

62788.4

One common spatial arrangement in these early urban schools consisted of a large hall and an adjoining gallery. The Educational Facilities Research Laboratory further reports that in the 1870's the Victorian Board of Education published plans describing a gallery room and a long room, sometimes 75 feet by 17 feet divided into four sections by curtain partitions. In this kind of school classes were usually taken by monitors or assistant teachers, and when the master wished to address the whole school the curtains would be pulled back to the walls. The so-called gallery room was a separate room where the master or mistress gave a lesson, using the method of 'simultaneous instruction'. This system of instruction consisted of a direct exposition by the teacher, the kind of methodology referred to in professional jargon as 'chalk and talk'. The Perth Central Infants' School built in 1897 is an example of this design. It contained two such galleries adjacent to the main hall, each gallery accommodating 125 infants (see Figure 5). Fremantle Boys' School was constructed in a similar design and Figure 6 illustrates the structure of a gallery that was constructed in 1870.

There is an interesting comparison between these hall-gallery designs and the current open plan buildings. Both were provided with facilities such as flexible space, partitions and adjoining spaces for specialised activities.

As schools expanded in size at the beginning of this century, school buildings took on a style based on a central hall design. This layout focused on the unifying function of the central hall which could be used for school assemblies and small group activities.

Another distinctive feature of the central hall model was the self-contained classroom. A development with important ramifications for school design was the erosion of the notion of 'assistant teacher'. The teaching profession now accepted the principle that the assistant teacher was in fact competent to instruct pupils in a separate, enclosed classroom. Figure 7 illustrates a typical central hall design in the Subiaco School built in metropolitan Perth, Western Australia. This particular school was opened in 1897 and had evolved to a central hall

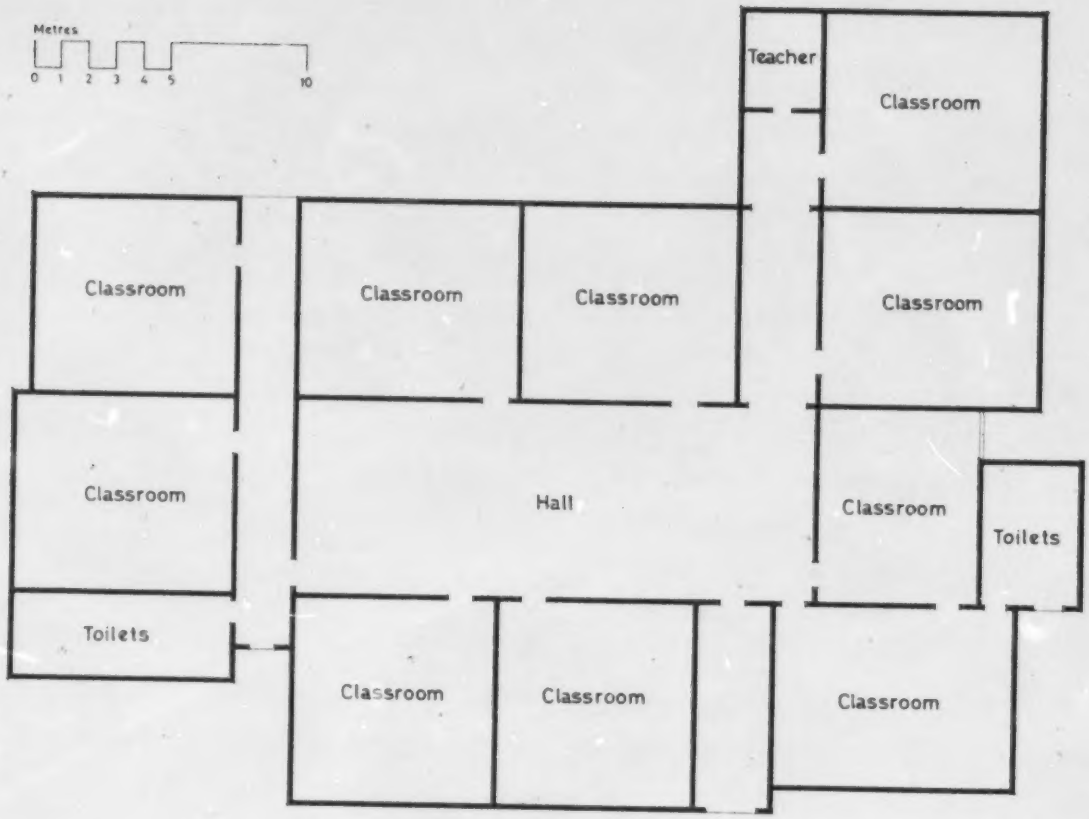


FIGURE 7: CENTRAL HALL DESIGN: SUBIACO SCHOOL, WESTERN AUSTRALIA (1912)

model by 1912. The need for larger schools in urban areas and the greater degree of confidence being placed in the better trained assistant teachers led to the building of self-contained classrooms where one teacher was responsible for one class.

By the early 1920's a number of criticisms had been levelled at this design. It was considered that these buildings were often poorly lit and ventilated, while activities in the hall created a general disturbance. Furthermore, when the central hall became surrounded with classrooms it was difficult to extend the school building without losing the main characteristic of the design, namely the direct access from classrooms to the central hall. The rows of classrooms that appeared

as extensions to the central hall design thus became forerunners of the linear designs of later years, in which classrooms were placed in rows with no provision of a hall of any kind.

After World War I, the emphasis in school construction was on providing improved physical conditions. With a desire to incorporate better lighting and ventilation the linear plan was introduced. This design was probably a derivative of the so-called 'open-air' schools in the United Kingdom. The linear design (see Figure 8) usually dispensed with the hall and so extended the system of the separation of classes. This model consisted of a row of self-contained classrooms conveniently connected by adjoining verandahs. As well as providing a more comfortable physical environment, the verandahs were described in Western Australia as 'facilities for open-air teaching', an innovation popular in English nursery schools at this time. However, in some cases these spaces were enclosed to form a common corridor for the separate classrooms.

Many English educators of this period were emphasising the measurement of mental age and this attitude influenced Australian educators. Seaborne (1971, p.39) suggested that theorists proposed that children of the same mental age were much better fitted to work together and that it was important to accommodate children with approximately the same I.Q. into the same class. Subsequently, in both the United Kingdom and Australia, the self-contained classroom with its scope for the management of homogeneous groups of pupils became an accepted feature of school design.

Another advantage of the linear or verandah plan was that extensions could be added in numerous patterns. It was easy for architects to plan additions to the linear model by adding 'wings' of like design to the original structure, thereby creating a quadrangle design (see Figure 9). One expansive development was the 'finger plan', so called as the school resembled a hand often with the administrative and service rooms forming the 'palm' and the rows of classrooms the 'fingers' (see Figure 10).

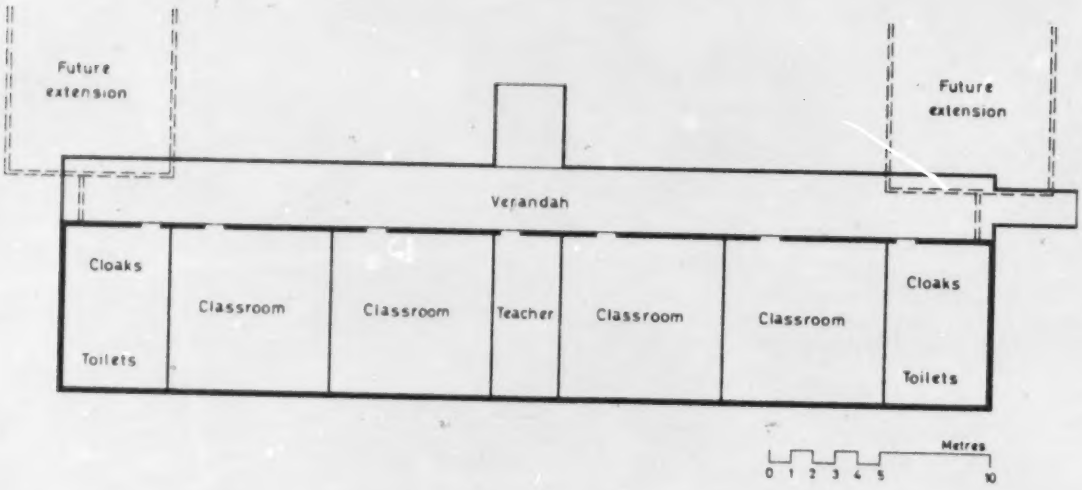


FIGURE 8: LINEAR DESIGN: KENSINGTON SCHOOL, SOUTH PERTH, WESTERN AUSTRALIA (1925)

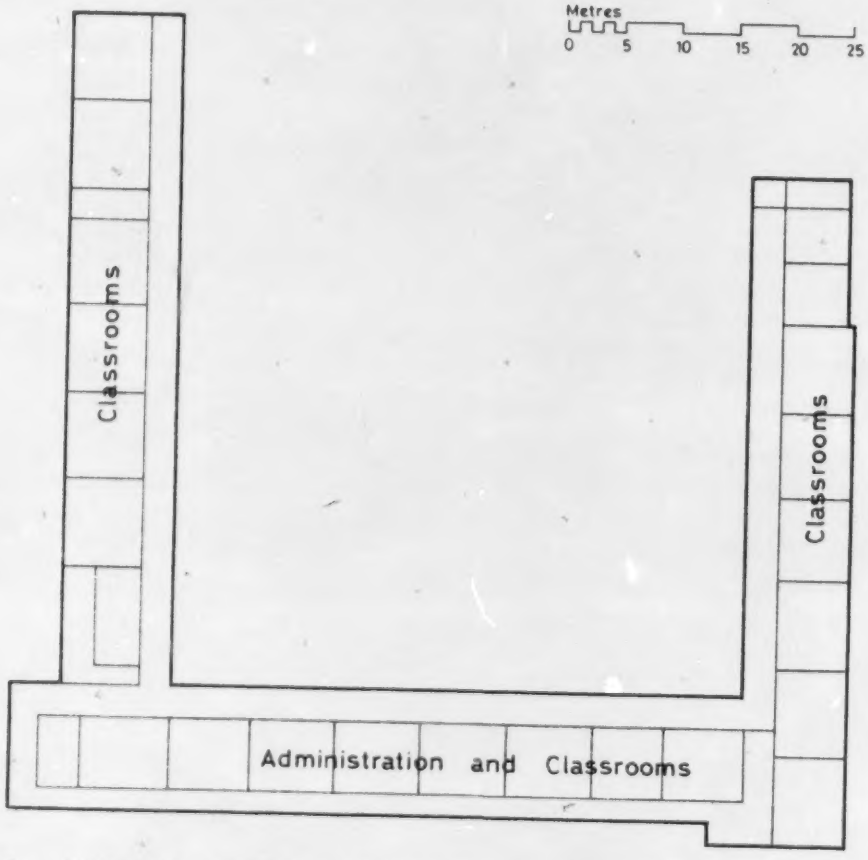


FIGURE 9: QUADRANGLE DESIGN: YOKINE PRIMARY SCHOOL, WESTERN AUSTRALIA (1959)

Throughout the 1930's schools in Australia, particularly primary schools, were invariably designed as a series of self-contained classrooms with few, if any, specialised areas. Cunningham, McIntyre and Radford (1939) reviewing education in Australia just prior to the outbreak of World War II, were clearly critical of the short-comings of the school building programme:

> Australian education, especially at the primary school level, is severely handicapped by a number of antiquated buildings erected forty or fifty years ago...it is true to say that most Australian State school buildings are somewhat utilitarian in appearance and far from extravagant in equipment. No Australian authority has yet found it possible to build a school which includes a library, an auditorium, a cafeteria, practical work shops, a gymnasium, a swimming pool, and a hot water service...(p.196)

After World War II, the major preoccupation of the State Education Departments was in meeting the challenge of a rapidly increasing school population. To provide immediate accommodation most States turned to an emergency school building programme. Prefabricated classrooms of single or dual unit types were erected and other emergency measures such as transferring disused school buildings to new sites, helped to ease the crisis. In this situation there was little scope for improving school design with the prefabricated Bristol classroom becoming a common addition to Australian school sites in the early 1950's. By the middle of the 1950's the State Education Departments were in a position to begin planning a substantial expansion of their permanent building programmes. Most design developments that followed were derivatives of the linear plan with the quadrangle and finger plan designs being popular models in the late 1950's and early 1960's.

Origins of Open Plan Concept in the United Kingdom

Although similarities can be seen between some open plan architecture and some of the British monitorial schools of the early 19th Century, the germ of what has come to be known as 'open planning' may be found in the British nursery schools of the 1920's. These schools, pioneered by the progressive educationist Margaret McMillan, anticipated many of the

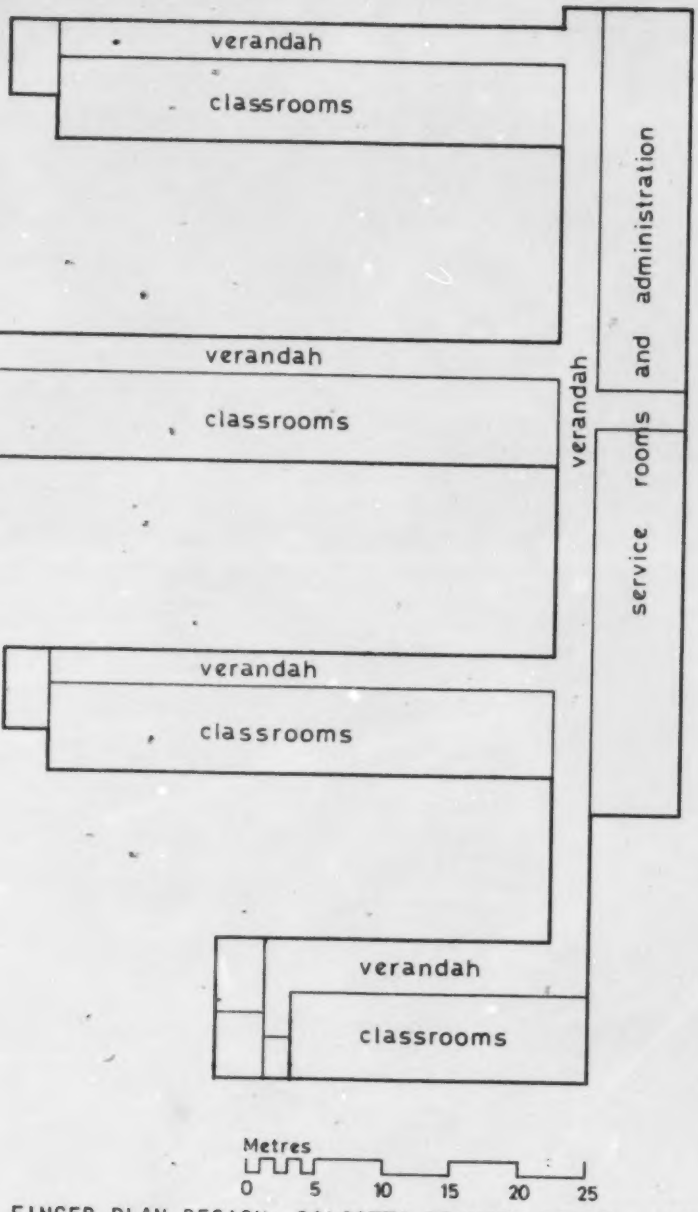


FIGURE 10: FINGER PLAN DESIGN: BALCATTA PRIMARY SCHOOL, WESTERN AUSTRALIA (1964)

innovations of the 1960's. In the *Infant and Nursery Schools' Report* (Board of Education, 1933) one witness described the innovative nursery school in the following terms:

> The ideal Infant School is not a classroom but a playground, that is to say, not a limited space enclosed by four walls and a ceiling, but an open area...where the interests natural to this biological stage of growth can be stimulated and pursued. (p.161)

Further impetus to this development was the circumstance of temporary accommodation in the United Kingdom during World War II, which according to Blackie (1968) was not the unmitigated disaster for education that many might have expected:

> Evacuation and bombing broke up the schools but they forced all teachers into a new relationship with the children, jerked everybody out of their ruts and made all sorts of improvisations and makeshifts necessary. Teachers who had taught the same stuff in the same city classroom for fifteen years found themselves in the fens, or the hills, or the farmlands...and they had to re-think what they were doing. (p.10)

Lowndes (1969) quoted the parliamentary debates on the Education Act of 1944, to emphasise the influence of both the nursery schools and the war on education practices - 'what Margaret McMillan proved to the few, war experience has proved to the country'. (p.271)

The 1944 Act itself changed the direction of educational organisation in the United Kingdom and in part fostered innovation. The legislation changed the emphasis from the 3R's to the 3A's: from reading, 'riting and 'rithmetic to learning geared to age, ability and aptitude. *The Nation's Schools: Their Plan and Purpose* (1945), the first pamphlet published by the Ministry for Education, set out the goals for the new legislation:

> When completed - indeed, when it is carried into effect - there will still remain the major task - primarily the task of teachers, though administrators have their part to play - of ensuring that the schools so provided shall fulfil the high purpose...to secure for children a happier childhood and a better start in life...Local initiative and experiment will be more than ever necessary if the Act is to fruitify fully in all the parts, with their varying conditions, of England and Wales. (p.3-4)

In this educational environment there emerged in the 1950's a revived and extended interest in informal education and the implications of this for school design. At the same time Pearson (1972), noted that a group of architects emerged who began to specialise in school design. This new breed of architects studied educational trends and visited classrooms where innovations in design and methods had been effected. Although the main task of these architects was to reduce

school building costs, the new liaison between themselves, teachers and administrators formed the basis around which fundamental changes in design occurred. As early as 1949, the Ministry of Education recognised its own Architects and Buildings' Branch, and established its Development Group to work in close collaboration with local education authorities. Its objectives were twofold: to build new schools which would keep pace with changing educational thought and practice, and to secure he maximum possible educational value for the money expended on school building.

In 1956 the Ministry's Development Group made a detailed study of junior school requirements and the result was a new school at Amersham in Buckinghamshire. This structure was an eight-class junior school with the classrooms arranged in two groups of four. The individual classrooms were quite distinct, however there was easy access between classrooms and there were shared practical areas. Seaborne (1971), described Amersham Junior School as a prototype of what may be called the semi-open primary school. Later design developments at Finmere, Oxfordshire in 1958 and Eveline Lowe, London in 1966 witnessed the adoption of open plan architecture.

The Plowden Report (1967), cited these three schools - Amersham, Finmere and Eveline Lowe - as examples of successful building design attempting to take account of current educational and social problems.

Origins of Open Plan Concept in North America

Across the Atlantic there was at the same time similar interest in educational architecture in the United States of America and Canada. In 1958 the Ford Foundation, which backed much of the early educational experimentation in the United States, made a decision to tackle the problem of school design. Some educational authorities in large urban centres were concerned with the task of providing sufficient and effective school accommodation. For this purpose the Foundation set up and funded the Educational Facilities Laboratories (E.F.L.) in New York City. Working with schools and administrators, the Laboratories began undertaking projects of research

and experimentation in design of educational facilities. It is difficult to assess the extent to which these programmes were responsible for the subsequent transformation in school architecture but it can be assumed that their efforts accelerated the process to build new designs, including open plan models. In 1965 educators and architects in Toronto, Canada, followed a similar pattern. They established the Study of Educational Facilities (S.E.F.) to recommend the kinds of school building facilities required to accommodate the needs of education in the present and future for metropolitan Toronto.

Both E.F.L. and S.E.F. have advocated and promoted developments in open architecture in the United States of America and Canada. Together these organisations have provided a direction to reform in school architecture that otherwise might have been lacking, so much so that open plan schools - or schools with open space included - were almost commonplace in the United States by the beginning of the 1970's.

E.F.L. (1971) reported on the increasing number of these schools being constructed:

> Open plan schools - or schools with open space included - are almost commonplace in the United States today. Over 50 per cent of all elementary and secondary schools built within the last three years are open plan design. The total cost of open space schools built within the last five years has topped $1 billion. (p.2)

It is therefore not surprising that with these building innovations in the United Kingdom, the United States of America and Canada in the 1960's, Australian educators should have become interested in the new open designs.

CHRONOLOGY OF OPEN PLAN SCHOOLS IN AUSTRALIA

In detailing the development of open plan schools it is difficult to identify one particular school system in Australia as the innovator of the new architecture. At least three State systems, South Australia, Western Australia and New South Wales, could claim to have first introduced aspects of open plan architecture.

South Australia's wide scale adoption of open plan design probably serves as a useful starting point in the chronology. Between August 1967 and February 1968, the then Director of Primary Education in that State toured the United Kingdom, several European countries, the United States and New Zealand where he observed recent developments in school building design. Writing after his visit in 1969, Dodd, as senior primary administrator, emphasised the need in South Australia for a different kind of school in which teaching could proceed flexibly in areas made quickly adaptable for different kinds of learning experiences.

Lawson (1972) reported that Dodd observed and listed a number of overseas innovations in open plan units:

> The acoustic treatment of floors, walls and ceilings and its value regarding classroom noise.
>
> The variety and volume of the equipment supplied.
>
> The flexible use of lightly constructed modern furniture.
>
> The way in which natural features were used to provide pleasant surroundings.
>
> The use made of large centrally situated resource areas.
>
> The use made of outside teaching areas.
>
> The attempts being made at co-operative teaching and the individualisation of instruction. (p.34)

Although all these innovations were not directly related to open plan architecture, this senior administrator apparently believed that many of them could be facilitated by open plan buildings. Subsequently, the first open plan unit was completed in August 1969 and located on the site of the Burnside Demonstration School (see Figure 11). This unit was an experimental module designed to be attached to an existing school that required additional accommodation. During 1970 and 1971

seven of these units were constructed at other schools. The Burnside unit was a two-teacher unit which included a general teaching area, withdrawal space, wet area, mobile room dividers and a semi-enclosed court. It was able to be constructed in a relatively short time, a factor which hastened the evaluation and extension of the open space concept into South Australian primary and secondary schools. During 1971 the South Australian Modular Construction (SAMCON) was employed to build two-teacher open units. A SAMCON was cheaper to build, capable of being increased or decreased in size as a school's need changed, capable of being erected in less time than solid buildings and able to be partly mass-produced.

As early as 1969, South Australian planning had envisaged a four-teacher unit which was designed and opened towards the end of 1971 (see Figure 12). This design was further developed with the planning of six-teacher units which were constructed by the end of 1972 (see Figure 13). The first school to be built entirely to an open plan design, as distinct from additions to existing schools, was opened in 1973 at Tea Tree Gully. This building incorporated both four- and six-teacher units.

With these new designs came the new nomenclature to describe the size of open plan units. Building modules were conveniently described as two-teacher, four-teacher and six-teacher units depending on the size of the open space enclosed by permanent walls. Within these units there were usually incorporated movable walls which a teacher could use to form separate spaces. However, teachers were obliged to at least make co-operative arrangements for use of specialised space such as withdrawal and practical areas.

Design developments in Western Australia followed a somewhat parallel pattern to the South Australian innovations of the late 1960's. In fact, consultant architects from the British firm, Peter Falconer and Partners, were engaged to assist with developments in both States. Following the overseas visit of Dettman, Director-General of Education, Cann, Assistant Principal Architect, Public Works Department and Stapleton, Assistant Under Secretary, Public Works Department, the Education Department of Western Australia

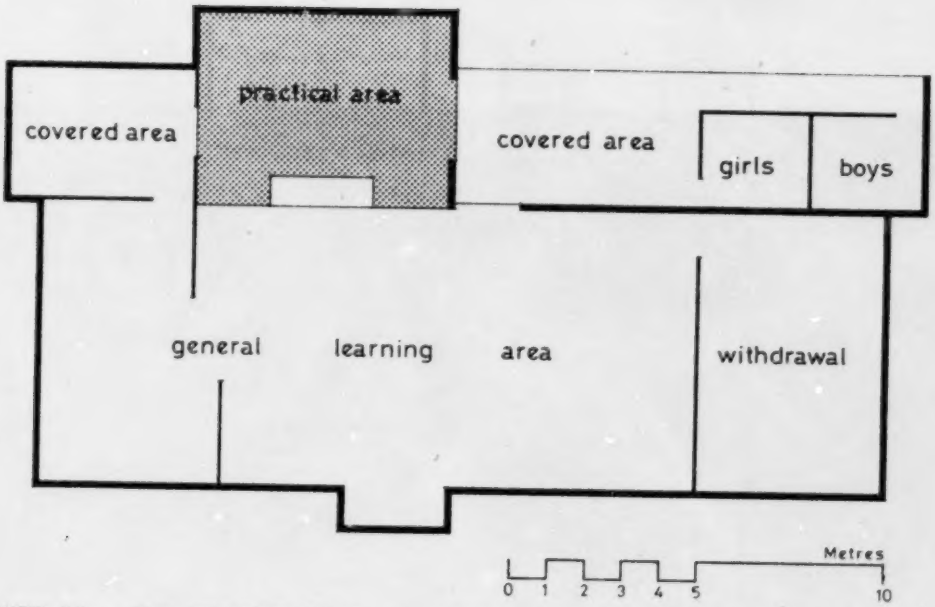


FIGURE 11: TWO-TEACHER UNIT, BURNSIDE DEMONSTRATION SCHOOL, SOUTH AUSTRALIA (1969)

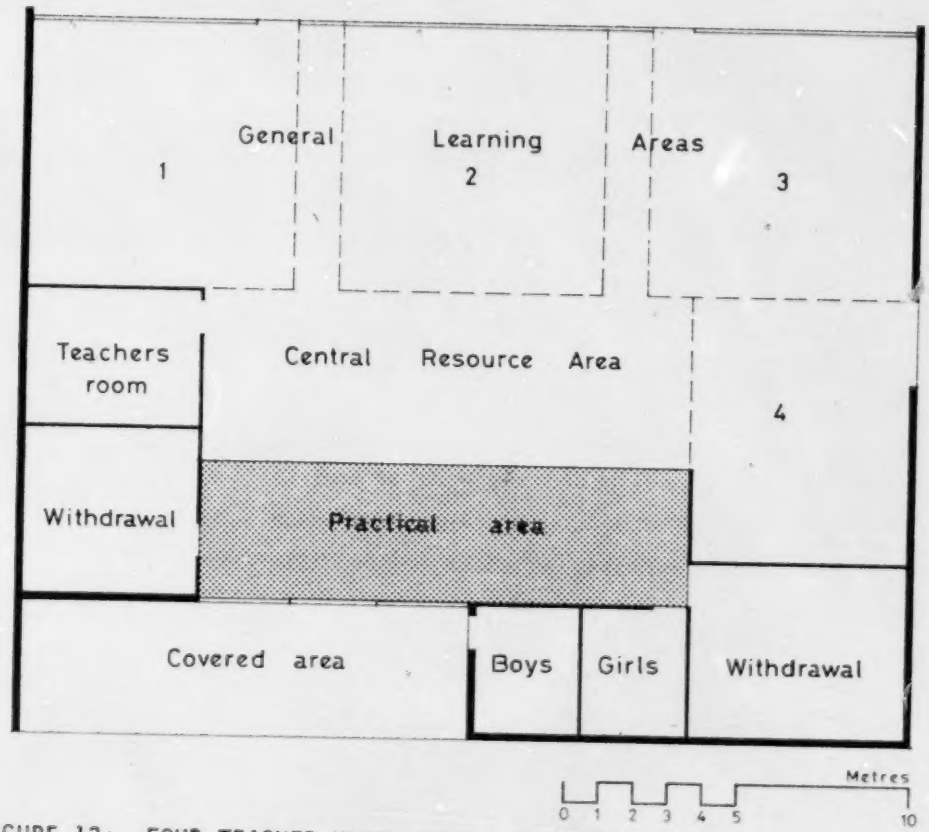


FIGURE 12: FOUR-TEACHER UNIT, SOUTH AUSTRALIA (1971)

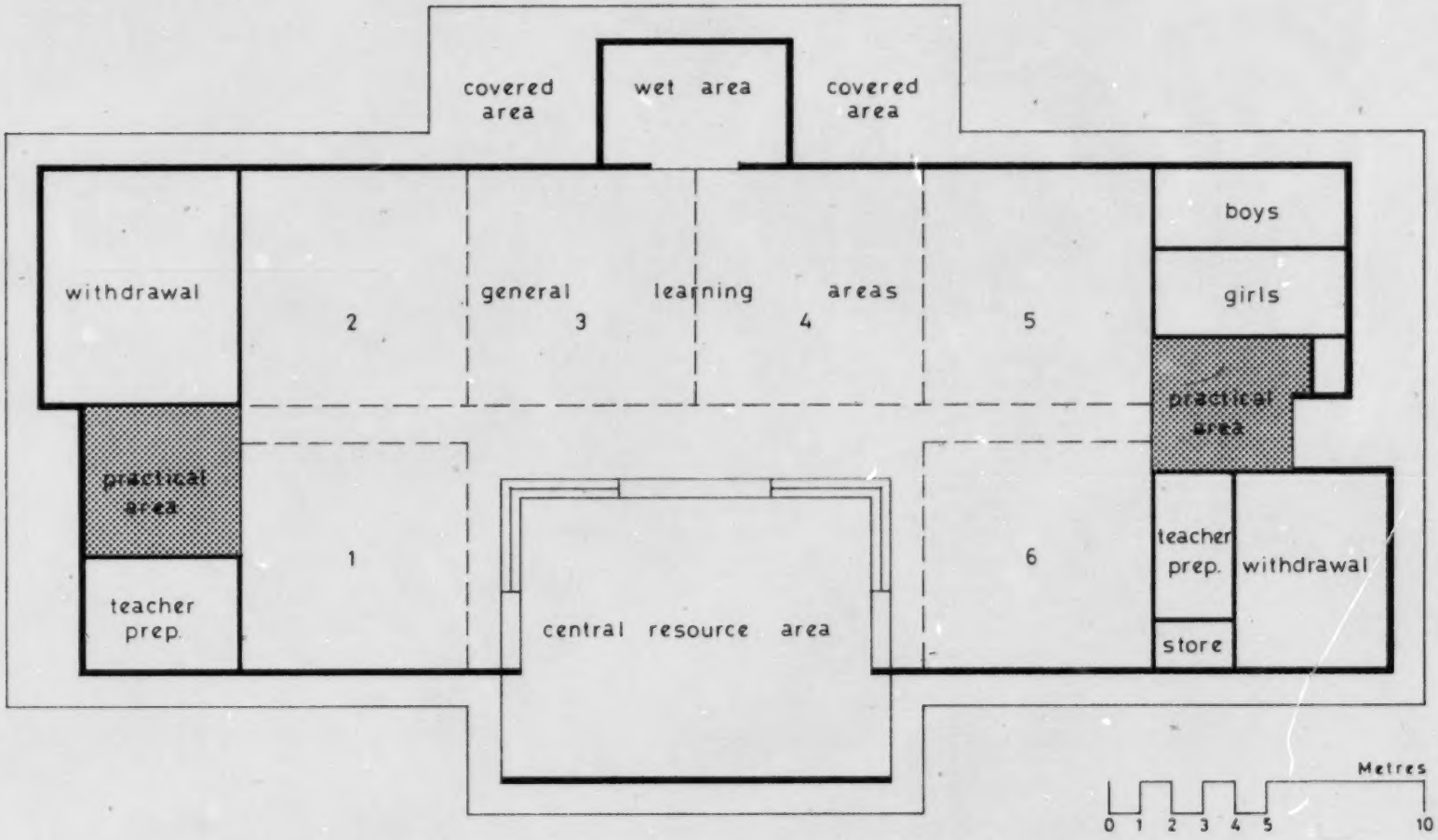


FIGURE 13: SIX-TEACHER UNIT, SOUTH AUSTRALIA (1972)

experimented with different designs. The first Western Australian school designed on open plan lines was the Bateman Primary School in metropolitan Perth which opened in 1970 (see Figure 14). This school consisted of six-teacher units in which general teaching areas were designed in pairs, separated partly by a wall and partly by movable chalk boards. Similar to the South Australian units, this design included practical and withdrawal areas to cater for the expected variety of grouping and learning experiences. However, as early as 1967 in Western Australia, several local attempts had already been made to depart from the well established 'finger plan' with the construction of a cluster school. Broadly speaking the cluster design consisted of six self-contained classrooms grouped around an open courtyard with convenient access from classrooms to courtyards.

Tasmanian interest in open plan design was evidenced by the visit of Professor MacConnell of Stanford University and of the consultant firm of Davis, MacConnell, Ralston, Inc., of Palo Alto, California in 1968. Shortly afterwards Gough, Director-General of Education, during an overseas visit made a point of inspecting open plan schools and other institutions in both the United States of America and the United Kingdom. On his return he gave full support to the use of open plan design in new schools then at the planning stage.

The first Tasmanian schools to attract widespread attention because of their design were the Roseneath (Hobart) and Miandetta (Devonport) Primary Schools, which were built as two-teacher units and opened in 1970 (see Figure 15). In addition to the concept of shared spaces attention was also drawn to the need for effective acoustic treatment through the use of carpet and acoustic ceiling tiles. However, prior to 1970, certain basic features of open plan buildings had already been introduced with the inclusion in the classroom of an activity area with water supply and sink.

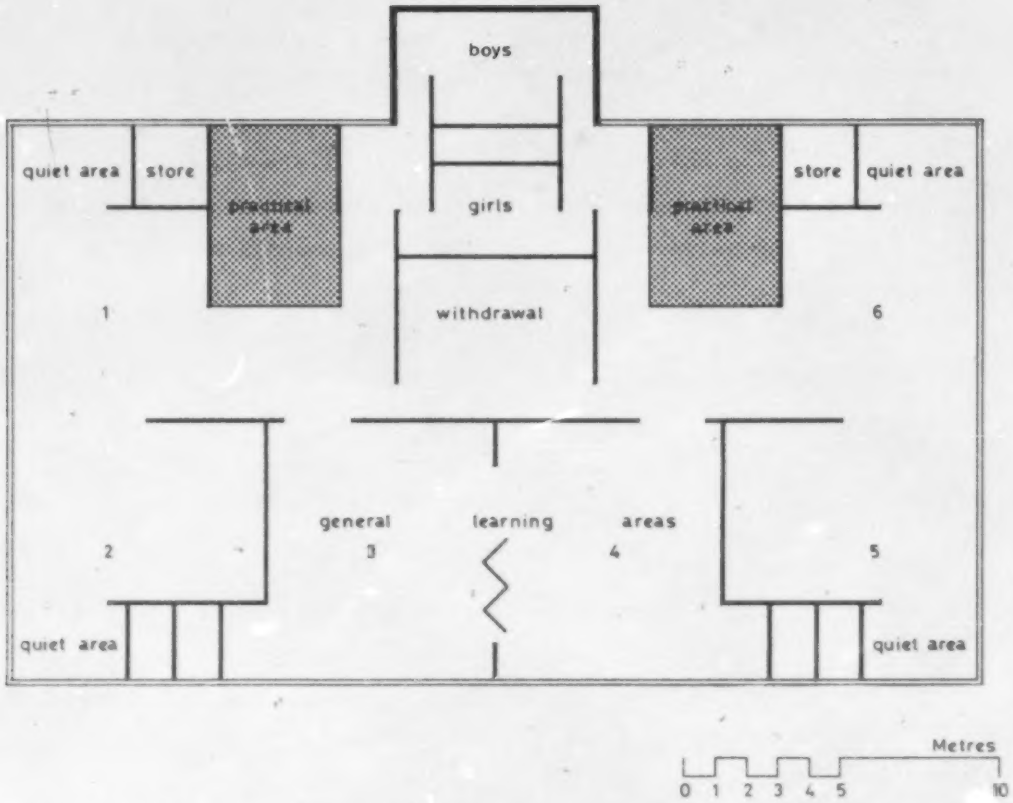


FIGURE 14: SIX-TEACHER UNIT: BATEMAN PRIMARY SCHOOL, WESTERN AUSTRALIA (1970)

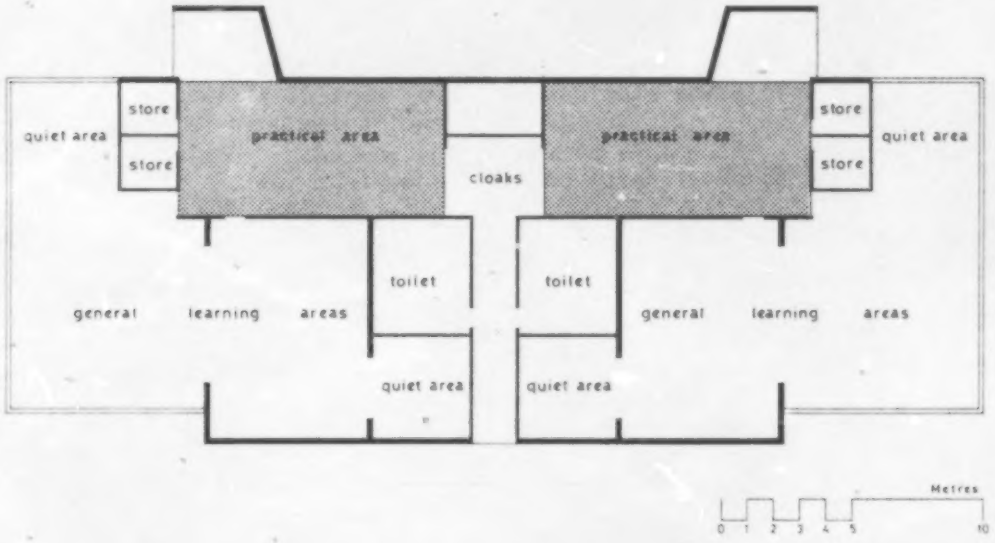


FIGURE 15: BUILDING WITH 2 TWO-TEACHER UNITS: ROSENEATH PRIMARY SCHOOL, TASMANIA (1970)

More recently, educational and architectural planners from Tasmania have been influenced by developments in South Australia more than anywhere else. During the years 1972 and 1973 three-teacher and four-teacher spaces were, in each year, incorporated into school designs. Although single self-contained classrooms have been built since 1973 in many localities, especially when no greater extent of accommodation has been required, there has been widespread construction of two, three and four-teacher spaces in all areas of the State. By the end of 1975 the Tasmanian Education Department was clearly committed to the development of the open plan design.

The building of a new school at Petrie Terrace in Brisbane in 1970 represented the first thrust into the construction of open plan schools in Queensland. This school, like others built subsequently along similar lines, was deliberately described in all official publications as a multiple-area school so as to avoid the implication that a particular 'method' was to be associated with the new building design. Hamilton (1972), as Director of Primary Education, stressed the significance of the descriptive term 'multiple-area school' as distinct from the terminology used in other regions. These new schools were based on a unit designed to accommodate the equivalent of four classes (see Figure 16). Some distinctive features of the Queensland design included teaching areas separated by a carpeted withdrawal room, an activity area extending the full length of the unit with a vinyl floor surface, and ceilings faced with acoustic tiles. Since 1970 all new schools and all additions to schools of two classrooms or more, have been built to the new design. Old classrooms are not being structurally modified at present, but it has been suggested by the Queensland Education Department that these may be re-modelled as finance becomes available.

In the Australian Capital Territory and the Northern Territory, as early as 1968, plans had been formulated to provide open space in primary schools. The first step taken in the modification towards open plan design was the inclusion of some operable walls between classrooms in the Weston Primary School (Australian Capital Territory) and the Jingili Primary School (Northern Territory). These schools

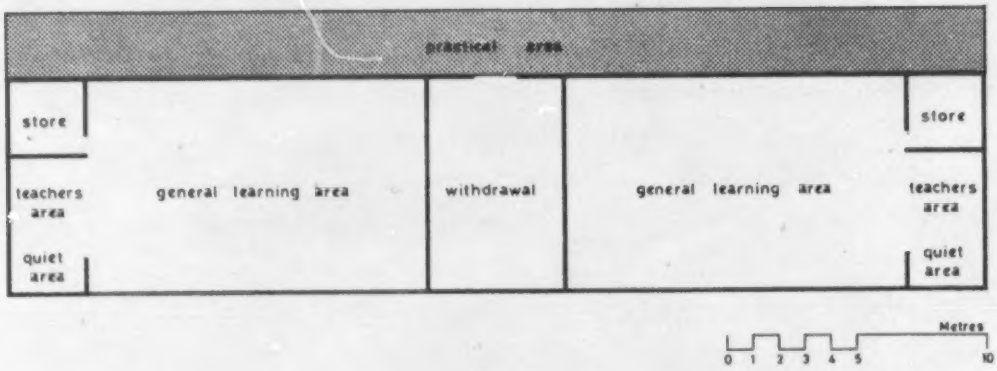


FIGURE 16: MULTIPLE-AREA UNIT: NORVILLE PRIMARY SCHOOL, QUEENSLAND (1971)

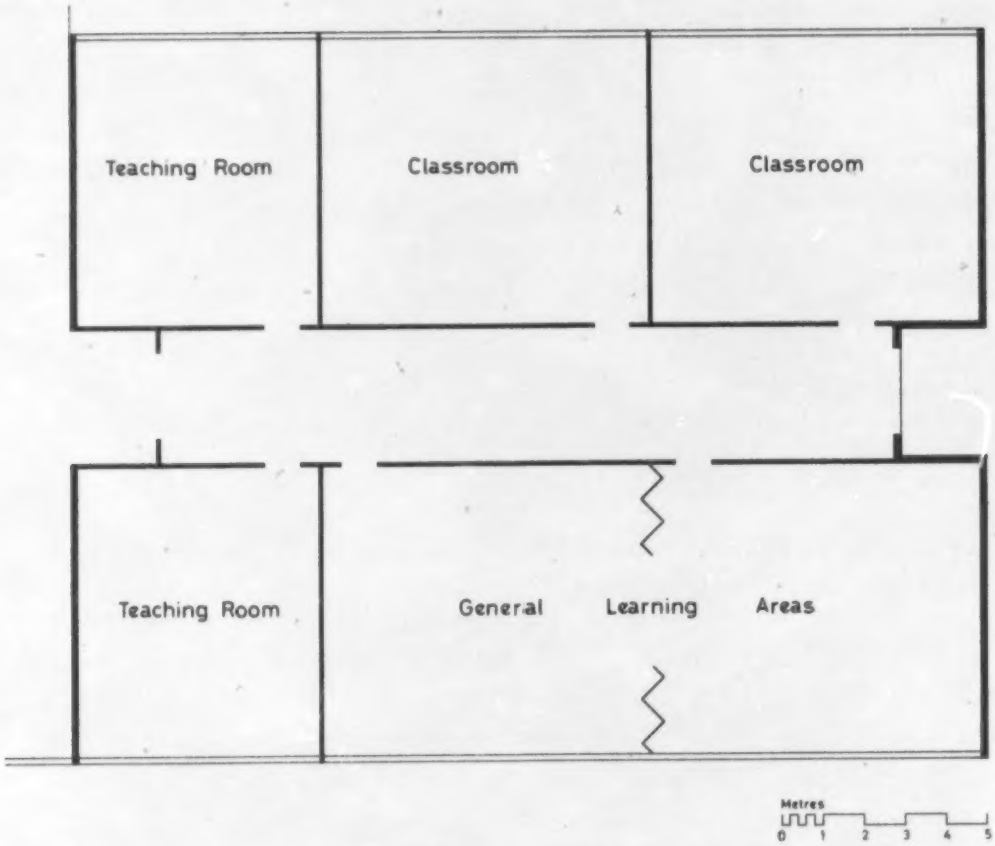


FIGURE 17: UNIT OF MIXED ARCHITECTURAL DESIGN: JINGILI PRIMARY SCHOOL, NORTHERN TERRITORY (1971)

were opened in 1971 and the degree of design modification can be seen in Figure 17. Following visits to Adelaide and Perth, building plans with a proportion of open space were developed in 1972 by the then Department of Education and Science for four primary schools in Canberra. A somewhat similar but more fully developed arrangement of this kind was introduced in the Northern Territory in the Wagaman Primary School which opened in 1973 (see Figure 18). The next stage of development was the construction of completely open plan primary schools in Canberra, the Weetangera and Duffy Schools, which opened in 1973. The primary and upper infant sections of these schools consisted of four-teacher units (see Figure 19) while the lower infant sections comprised three-teacher units. Of the schools constructed during 1974 in Canberra, one was based on Weetangera's completely open plan concept and the others represented a compromise insofar as both open plan and conventional classrooms were incorporated. Developments in 1975 essentially involved a new concept of grouping learning areas of varying size around a central library and materials centre.

The first decidedly open plan primary school unit constructed for the Victorian Education Department was opened early in 1972 on the North Fitzroy School site. Prior to this time there had been some conversions of existing buildings involving the removal of interior walls to create open space. The North Fitzroy unit was built as a wing for senior primary students and was also significant in that it marked the first step in a plan to rebuild the inner suburban primary schools of Melbourne. Constructed as a two-storey block, this design incorporated two four-teacher spaces and associated withdrawal rooms (see Figure 20). Following the events at North Fitzroy, three new open space schools were built in 1973 at Clifton Hill, North Melbourne and Carlton. It was noteworthy that the plans for the Neill Street School (Carlton) were drawn originally in 1968, possibly indicating the early interest of the Victorian Education Department in design innovation.

In the early 1970's there was some indication of a cautious approach in the implemention of open plan design. Despite these reservations, and partly to meet school needs of the outer suburban areas of Melbourne, the 'flexipod primary school' design was developed in 1973. The first of these flexipod units was constructed in 1975. The designs consisted of

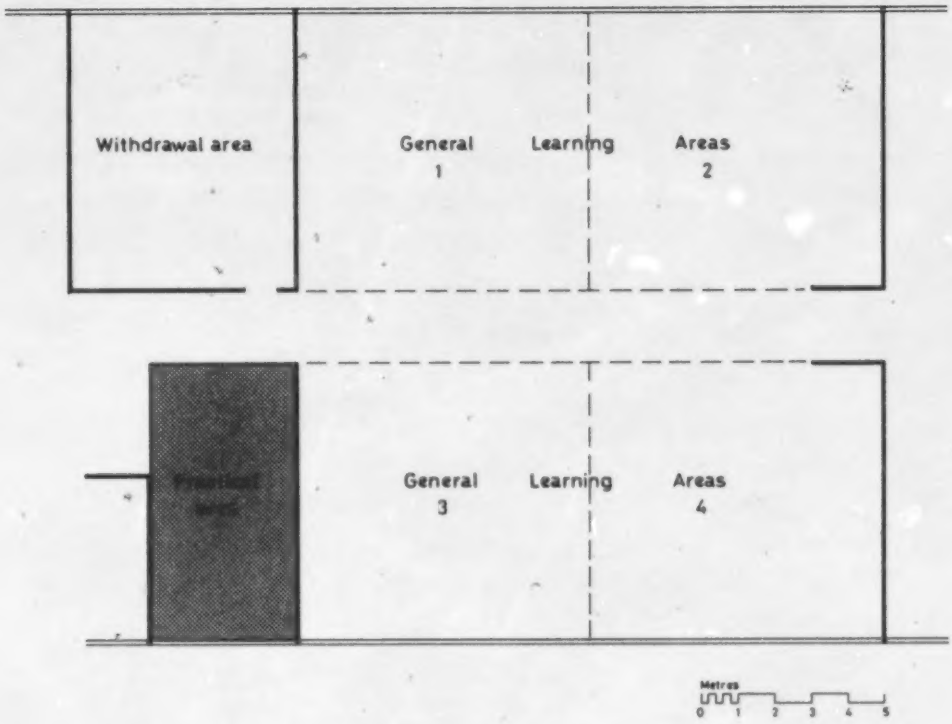


FIGURE 18: FOUR-TEACHER UNIT, WAGAMAN PRIMARY SCHOOL, NORTHERN TERRITORY (1973)

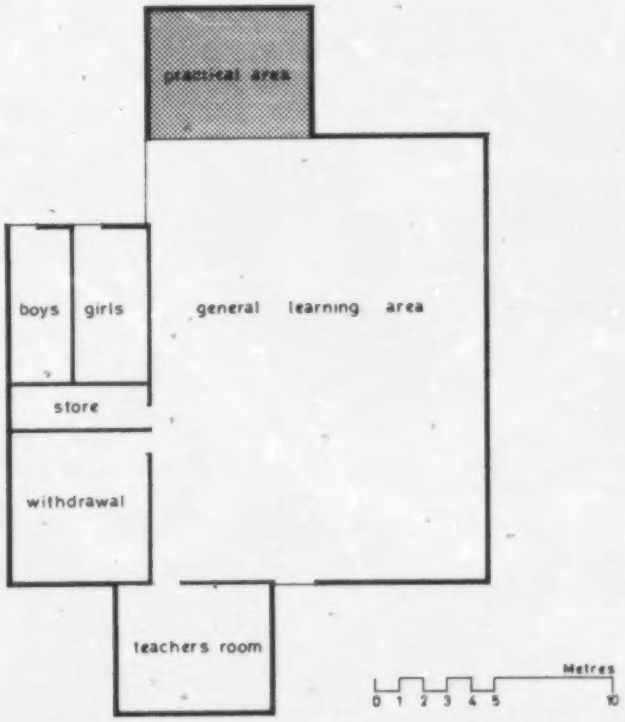


FIGURE 19: FOUR-TEACHER UNIT, WEETANGERA PRIMARY SCHOOL, AUSTRALIAN CAPITAL TERRITORY (1973)

four-teacher general learning areas with large wet areas, withdrawal rooms and teacher rooms. By the end of that year six other flexipod designs had been built in Victoria.

Although the New South Wales Education Department was tentative in its commitment to open architecture, one of the first ventures in Australia in the use of open space was at the Tregear Primary School. This unit opened in 1968 and was enthusiastically described by Devin (1969):

> If one looked for a single word to describe Tregear it might be 'flexibility'. Wide eaves act as protective umbrellas in sun and rain, sliding chalkboards become cupboards, children can see over storage walls, light streams in from 'top-lift' lofts, furniture is mobile, internal walls disseminate, external walls slide. A cupboard becomes a truck, one classroom becomes two and cost? - less than traditional construction. (p.1)

The Tregear School introduced some of the elements of open plan design, namely the innovation of operable walls between classrooms. The unit consisted of a two-teacher space and two self-contained classrooms (see Figure 21). Another innovation in New South Wales was the construction of the 'augmented classroom', which became the standard classroom design by 1972. The augmented classroom consisted of a self-contained classroom incorporating a quiet area and a wet area, hopefully to encourage more self-directed pupil activity.

In 1971 the Schools Building Research and Development Group was established by the Departments of Public Works and Education in New South Wales to prepare educational briefs. The first open school designed by this group was built at Murray Farm and was based on two-teacher learning areas. By 1972 the New South Wales Education Department had planned to build two-teacher open space units and also schools in which separate classrooms were clustered around a shared practical area. The continuing limitation of open planning to two-teacher units rather than the larger units found in some other States was reflected in a statement published by the Department of Public Works (1975):

> A two-teacher unit is considered to be the optimum learning area. However, it is also desirable that two learning units share common facilities, yet still retain their individual identity if so desired. (p.2)

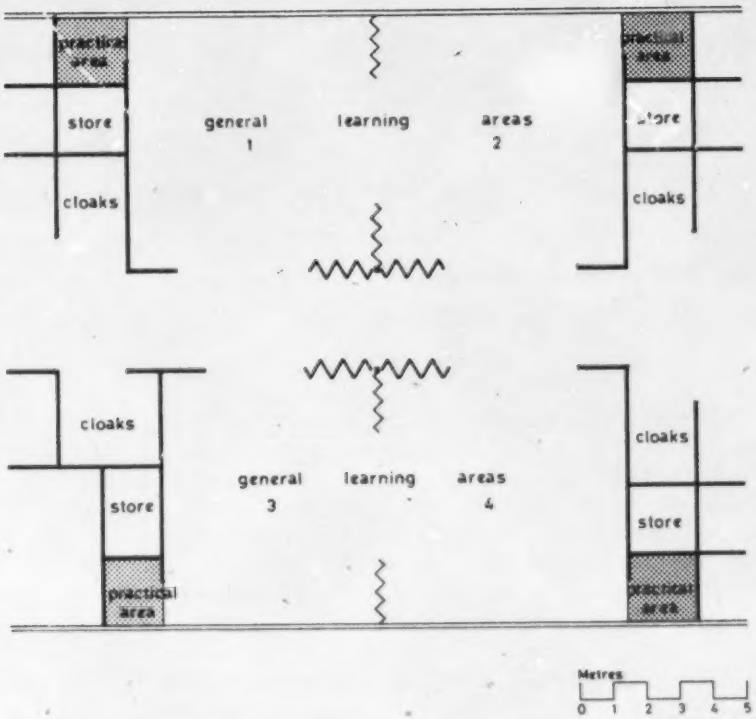


FIGURE 20: FOUR-TEACHER UNIT: NORTH FITZROY SCHOOL, VICTORIA (1972)

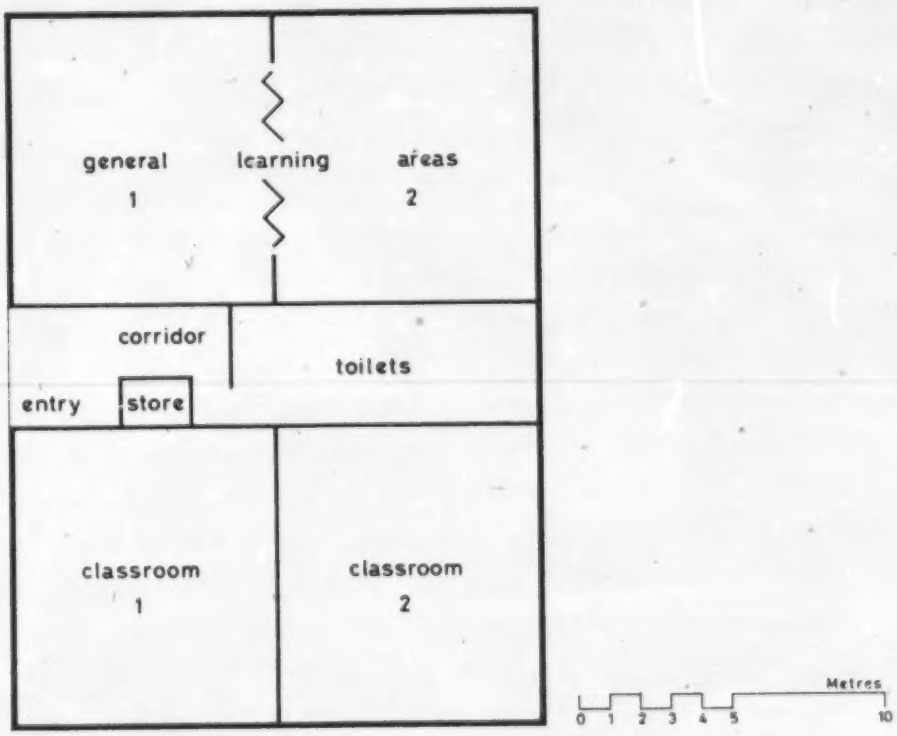


FIGURE 21: UNIT OF MIXED ARCHITECTURAL DESIGN: TREGEAR PRIMARY SCHOOL NEW SOUTH WALES (1968)

Consequently, by 1975 all the Australian States and the two Territories had adopted some form of open plan architecture. Some States such as South Australia and Western Australia had enthusiastically constructed open plan schools; other States such as Victoria and New South Wales had been more cautious in their approach.

EDUCATIONAL RATIONALE

It is not always easy to identify and locate definitive evidence of an educational rationale to support the introduction of open architecture. However, Departmental statements on the new design do contain some assumptions and assertions about the expected advantages of these new schools.

Individual Differences

A common emphasis in official statements is that the new schools would cater more effectively for the wide range of needs, aptitudes, rates of learning and interests of pupils. Related to the concern for individual differences was a recognition that most worthwhile learning is achieved in a wide variety of situations and by a wide variety of techniques. One of the earliest and most decisive declarations by an Australian educationist on the perceived value of open architecture came from Dodd (1969), the then Director of Primary Education in South Australia:

> Education is now seen as a matter of developing latent powers, cultivating attitudes and providing a rich environment to stimulate. The progressive teacher regards each child as an individual with his own needs, interests and aptitudes. He provides opportunities for the child to proceed in the basic subjects at his own pace...The need is for a different kind of school in which teaching can proceed flexibly in areas quickly adaptable for different kinds of learning situations. (p.3-4)

A somewhat similar statement appeared later in Western Australia (Education Department of Western Australia, 1970):

> Schools which are being designed for the 1970's will make greater development of the individual possible. This is vital, not only because it is true of the spirit of education, but because education is faced with a situation in which old ways are no longer adequate. (p.36)

The perceived relationship between open architecture and individual differences was made clear by Hamilton (1972) who, as Deputy Director-General of Education in Queensland, stated:

> ...in order to cater for individual needs, interests and capacities, maximum flexibility of space, time and materials is required. (p.14)

Making provision for individual differences was also extended to teachers. Several administrators suggested that a flexible design could give full expression to different teaching styles. Hamilton (1972) obviously envisaged some scope for different teaching styles when he asserted:

> Let us be clear about one thing: Queensland's new primary schools have not been designed with the purpose of imposing upon teachers a given type of school organisation. On the contrary, the buildings have been designed to provide a great deal of flexibility and to allow the use of a wide variety of organisational patterns. (p.11)

Thus one can presume that open plan design would function as an important physical factor in causing teachers to co-operatively arrange certain learning situations for their pupils.

In fact, co-operative teaching was perceived by most educational administrators as an important outcome of the new design. Ryan (1971), the Victorian Assistant Director of Primary Education, envisaged a wide scope for teacher co-operation within architecturally open schools:

> Open planning is designed to encourage co-operative teaching, team teaching, differentiated teaching which makes use of the individual interests and skills of the teachers... (p.288)

Relevant to this matter is a comment by Hudspeth (1973) the Tasmanian Education Department Staff Superintendent (Buildings) suggesting that teachers desired scope for co-operative arrangements:

> ...with increasing emphasis on individual and group work by pupils there seems to be increasing desire among teachers to work co-operatively in a variety of ways. (p.51)

Student Grouping

Another aspect of the educational rationale for open plan school buildings was that new designs would allow for flexibility in grouping pupils for learning activities. Swan (1972) as Director of Primary Education describing the New South Wales designs, suggested that open units:

> ...may well provide the flexibility which we are all seeking to enable small group discussion, co-operative teaching, accessible teaching equipment and a resources centre to support the learning programmes. (p.i)

The value of such flexibility was even more clearly defined in Western Australia (Education Department of Western Australia, 1970):

> The old concept of the classroom as a separate entity within the school is disappearing. The most efficient teaching demands the use of the skills of each teacher to the best advantage, and a school in which groups can be made large or small as needed provides the best environment for teaching of this kind. (p.36)

Pleasant Environment

One continuing theme throughout the literature on open plan schools is that they would provide a more stimulating and pleasant environment than traditional schools. From the beginning the new schools were promoted as being aesthetically appealing and they incorporated a range of furnishings which would make the learning environment more comfortable. It was generally assumed by educationists that such factors would combine to provide a pleasant physical environment for pupils and teachers.

A Comprehensive Rationale

One of the most comprehensive statements which can be interpreted as an educationale rationale was made by Palmer (1973), the then Director of Primary Education within the Education Department of Western Australia. Palmer specified the following four objectives for open plan schools:

1. There should be a flexibility built into a school which will allow for educational change.
2. The design should recognise and provide for the individuality of teachers as well as pupils.
3. Although each person is different, education is still a social process and the school should provide for teachers and pupils to communicate and work together as well as engage in individual study.
4. The design should enable a choice of both organisation and method and should not compel either a particular educational approach or organisational structure. (p.4)

Finally, the expectations that administrators in Australia perceived for open plan schools can be synthesised to form a *comprehensive rationale*. Open plan design will:

(a) cater better for the individual differences of both pupils and teachers; pupils can learn in different ways and teachers can adopt various teaching styles;

(b) foster teacher co-operation;

(c) provide scope for different social arrangements of pupils;

(d) provide a more pleasant, stimulating environment for pupil learning, and

(e) allow for change in educational practice.

Certainly not all educational administrators declared these expectations as the objectives of their open plan schools. The above list is merely an amalgamation of each rationale derived from statements issued by the six States and the two Territories. Most primary school systems were in some way or other committed to the majority of these objectives.

IMPACT OF OPEN PLAN DESIGN

With the introduction of open architecture both teacher and pupil were thrust into a new physical environment. It was reasonable to ask whether the behaviour of teachers and pupils changed as a consequence of the new environment. In a partial answer to this question Angus, Evans and Parkin (1975) observing patterns of behaviour in both conventional and open plan classrooms, concluded that on the whole instruction and learning experiences were being conducted along relatively traditional lines in the open plan schools. Three major reasons were cited to explain this finding:

> Firstly, at least in Western Australia, the [open plan] schools were not designed specifically to facilitate progressive teaching practices...Secondly, it is proposed, school design is a less powerful determinant of teacher behaviour than school organisation and teacher tradition. ...Thirdly, among the schools participating in the study, the differences in design between open plan and conventional classrooms were less real than first imagined. (p.33)

If this contention is correct, the impact of the open architecture on the educational programmes developed in classrooms has been minimal. This conclusion may be surprising to some educationists and teachers who expected more creative and productive learning experiences in the new schools. On the other hand, criticism of the open plan has been that the physical environment combined with progressive methodology has caused over-emphasis on creativity and self-expression to the detriment of the basic learning skills. So the open plan classroom has been assailed on two accounts: firstly, that it has generally failed to change teaching styles and secondly, that with open teaching methods it has undermined standards of discipline and achievement. Some definitive conclusions about open plan architecture may be forthcoming when the major report of the Australian Open Area Schools Project is completed. The major survey sets out to analyse the learning outcomes in a sample of traditionally designed and open plan schools in Australia.

However, even accepting that open plan classrooms have not substantially changed the learning experiences of pupils, significant changes have taken place in the working relationships of some teachers. In many schools teaming among teachers has occurred and this would logically suggest a shift in decision-making from one teacher to a group of teachers. Secondly, some teachers now work in full view and within hearing distance of each other.

George (1976) reports studies in the United States indicating that there was more teacher-to-teacher interaction in open plan schools than in conventional schools. Teachers in these open plan schools reported significantly more interaction than conventional school teachers in both informal talk with colleagues and in frequency of interaction via team meetings.

In the open space areas teachers are now placed in circumstances where they can observe and be observed by their colleagues. Such mutual observation has led to increased awareness of and subsequent informal evaluation of teachers by teachers during instructional activities. Though this process may have the advantage of stimulating teachers' positive responses to the possibility of professional criticism, it may produce anxiety in some teachers particularly during the initial period in the new environment.

With the advent of open plan schools there was a need to prepare teachers for the new environment. In Australia, most States have encouraged teacher development in open plan schools through appropriate in-service courses with South Australia adopting by far the most comprehensive and intensive programme. Whalan (Education Department of South Australia, 1974), Superintendent of Primary Education summarised his Department's programme up to 1974 as follows:

> The techniques of teaching in open space conditions are being steadily developed in South Australian schools. Many conferences for teachers have been held; these conferences have covered most of the practical and philosophical areas. ...South Australian inservice conferences have contributed quite a respectable number of home-grown, but unpublished reports. It should be noted that all the writings available are directed towards teachers in open space conditions. (p.3)

Fundamentally, the programme in South Australia had two main foci: first, the in-service education conducted within the school by the head-master, district inspector and open area consultants; second, the official in-service education which usually involved one week of residential in-service for teachers about to move into open units. The first open plan conference was held in mid 1969, and by 1972 ten such residential conferences had been held in South Australia on the subject of 'Teaching in Open Space Units'. In South Australia teachers were not deliberately selected, but were invited to apply for appointment to open plan schools. This practice was later adopted in some other States. A unique feature of the South Australian programme was the establishment of a team of consultants who could visit open plan schools as the need arose. Furthermore, school staffs attempted to acquaint parents with the teaching and learning approaches used in open plan schools.

Other State Departments have not matched this commitment to in-service education. Part of their dilemma has been the absence of clear statements of purpose sufficiently specific to be meaningful at a practitioner level. The embracing of the concept of 'flexibility' has to a degree passed the responsibility for instruction from the administrator and architect wholly into the lap of the teacher. How do you mount an in-service programme to train teachers to be flexible in their use of a building when there is little definition of the programme to be accommodated in the building? This problem has been exacerbated by the absence of numbers of effectively operating 'model' open plan schools, the inevitable result of transplanting an educational phenomenon from one country to another.

The impact of the new architecture in Australia produced various contrasts in style and implementation. Design development in each State and Territory has taken on its own local character with some interesting comparisons and contrasts. In terms of implementation, Queensland and Western Australia have developed standard models for State-wide implementation. That is, in Western Australia it is possible to refer to the 1968, 1969, 1970 and 1972 design types. However, invariably with the standard models there have been necessary modifications to meet various accommodation and climatic

circumstances. These standard designs were in fact four- and six-teacher units in Queensland and Western Australia respectively. By contrast, Tasmania has implemented a variety of designs, namely two-, three-, four- and five-teacher units. In Victoria and New South Wales the open architecture programme has been restricted in its implementation within an experimental framework. Nevertheless, one of the most ambitious projects in open plan design is in Victoria, where the Collingwood Education Centre has incorporated primary and secondary wings plus community facilities within a three storey building. Another significant contrast between the early building programmes occurred in Western Australia and South Australia. Whereas the Western Australian Education Department generally concentrated on building totally new schools to an open plan design, the South Australian Department generally added open plan units to existing schools. The latter kind of building programme facilitated the organisation of internal in-service courses as open plan units were available on site for observation by teachers without any experience of the new structures.

Open plan school architecture in the period 1968-1975 has generally concentrated on design development at primary level schools. However, there is a striking exception to this in South Australia where as early as 1973 six flexible-plan high schools had been projected for that State. Elements of open plan design in faculty blocks have also been incorporated into Western Australian high schools since 1970, while by 1973 Queensland had developed an educational brief which introduced the open plan features of multi-purpose areas and operable partitions. By 1975 all States had open plan high schools of one design or another, either functioning or on the drawing boards.

One contrasting feature in the design development among the States has been the degree of physical openness. Probably the greatest degree of openness in school architecture in Australia is to be found in South Australia where eight-teacher units have been constructed. In Western Australia six-teacher units have been a standard design in most localities since 1970, whereas in Queensland four-teacher units have been built consistently during the same period.

In the later and current primary school designs there appears to be a tendency in some States to 'close up' the architecture. In 1974 in Tasmania, agreement was reached within the Education Department that no units housing more than three classes should be built, and for some situations a maximum of two classes per unit had been specified. South Australia seems unlikely to proceed with the construction of more eight-teacher unit buildings. Experimental designs developed in Western Australia in 1976 are based on two-teacher units, though specialised facilities may be shared by two or more teachers depending on the particular design. This planning suggests some reservations about the practical operation of large general learning areas. Nevertheless, some major distinctive features of open plan design have been retained with the incorporation of practical areas, withdrawal areas and operable walls. The tendency to 'close up' the architecture has possibly been the reaction of administrators to the feedback from teachers working in the new designs. Fitzpatrick and Angus (1974) suggested, in a survey of teachers' comments on open plan design, that there was a preference for two-teacher spaces.

The history of open plan schools in Australia is in fact seven histories of State school building programmes. Certainly, the different educational authorities have been influenced by overseas innovations, but each has developed its own architectural style to meet local needs. The development of open plan architecture has been a complex phenomenon. Largely, it can be explained by three major considerations: an emergence of a new recognition in education of the need to devise more individualised learning strategies, the economic response to purchase better value in school architecture and the influence of school design trends in the United Kingdom and North America.

The advent of the new schools emphasised more than before the need for closer consultation and co-operation between educators and designers. Medd and Medd (1971) stressed this perspective on the design development contending that 'school buildings could no longer be taken for granted, either by users or the designers' (p.7). Hopefully, school buildings have now become a product of joint venture, of a fusing of different skills and insights of educators and designers. In this context, school buildings should become more stimulating and effective learning environments.

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